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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

An Emergence Cage for Soil-Pupating *Rhyacionia* spp.

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Describes materials, construction, and installation of an inexpensive cage successfully used to determine adult emergence periods for the southwestern pine tip moth, *Rhyacionia neomexicana* (Dyar). The cage can be used to trap other soil-pupating *Rhyacionia* spp.

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The southwestern pine tip moth overwinters as pupae in cocoons attached to root collars of ponderosa pines. Cocoons are constructed about 1 inch below the surface of the soil, and often form a ring around the base of the tree (fig. 1). For life history studies and timing of control measures directed at the adult or later larval stages, we need to know when the adult moths emerge from overwintering pupae. This Note describes an inexpensive cage for determining adult emergence of the southwestern pine tip moth and other soil-pupating *Rhyacionia* spp.

Description

The cage (fig. 2) consists of an anchoring base band pressed into the soil and an upper portion fashioned from fiberglass screen. A strip of 24-gage galvanized sheet metal, 4-1/2 by 23 inches, is crimped along one edge at least four times to form a 7/16-inch reinforcing bead (fig. 3). The strip is then rolled to form a band which, when closed, has a circumference of 22

inches. The ends of the strip are overlapped about 1 inch to form a seam that is secured with two 3/8-inch No. 7 binding head screws.

A 24- by 12-inch piece of 18- by 16-mesh fiberglass screen forms the upper portion of the cage (fig. 4). The ends of the screen are first stapled together with three holding staples. A 1/4-inch fold is then stapled along the entire width of the screen to form a finished seam. A standard stapler and 1/4- by 1/2-inch staples are suitable for closing the seam. The screen is secured to the base band and to the tree bole with pieces of 20-gage iron wire (fig. 5).

Materials List

- 1 Base band, 4-1/2 by 23-inch, 24-gage galvanized sheet metal.
- 2 Screws, No. 7 binding head.
- 1 Fiberglass screen, 12- by 24-inch, 18- by 16-mesh.
- 25 Staples, standard, 1/4- by 1/2-inch.
- 1 Roll 20-gage iron wire; 30-40 inches used per cage.

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Cost of materials and construction is low. The most expensive item, the base band, can be fabricated and supplied complete with screws for about \$1 at most tin and sheet metal shops.



Figure 1.—Cocoons of *Rhyacionia neomexicana* around root collar of infested tree.

Figure 2.—Emergence cage in place on a small ponderosa pine.



Installation

1. Select a previously infested tree—one that shows signs of damage by shoot- or tip-feeding insects. Dry, withered terminal and lateral shoots that crumble when handled are signs of possible previous infestation. Avoid trees with excessive mammal digging around the root collar.

2. Prune away any protruding branches near the ground and along the tree bole as high as 8 to 10 inches above ground. Avoid excessive pruning, however, that may change the microclimate near the tree base. Clear rocks, limbs, and other debris away from the tree bole, but leave the needle litter and duff.

3. Remove screws from base band, open out, and place around the tree bole with reinforcing bead up. Close band and secure seam with screws.

4. Position band evenly around tree and press into soil with foot or rubber-headed mallet. Leave about 1 inch of band exposed for securing screen to the reinforcing bead.

5. Place fiberglass screen around the tree bole, staple ends shut with three holding staples. Fold width of screen about 1/4 inch and staple to form finished seam. Place staples close together to make a tight seam that will prevent escape of insects.

6. Place bottom of screen cylinder over reinforcing bead of band, overlapping bead at least 1/2 inch, and secure with a 30-inch piece of 20-gage iron wire. **Caution:** Make sure wire holds the screen tightly to the band below the reinforcing bead.

7. Press band and attached screen into soil flush with litter (fig. 2).

8. Gather top of screen cylinder into folded pleats and secure to tree bole with an 8- to 10-inch piece of 20-gage iron wire. Allow enough excess wire at the top of the cage to facilitate opening and closing the cage several times.

9. Attach identifying tag or flagging.

Field Use

These cages have been successfully used to determine adult emergence of the southwestern pine tip moth infesting ponderosa pines in Arizona. Cages were installed in late March at Chevelon, and examined at 2- to 3-day intervals until emergence was completed in early May. Cages were installed around both natural and planted pines with tree diameters at ground level ranging from 1/4 to 4 inches. Cage dimensions can be increased easily for use with larger diameter trees.

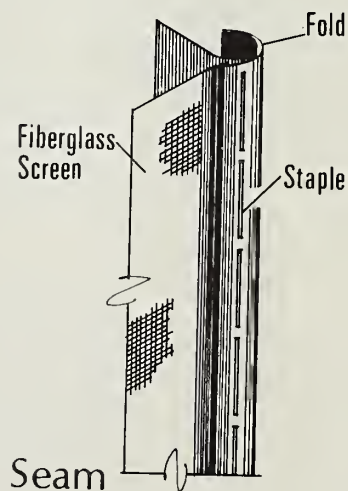
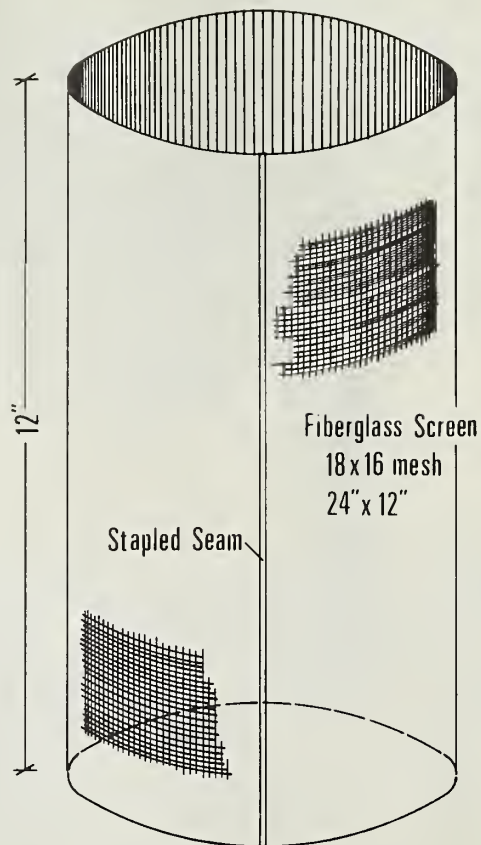
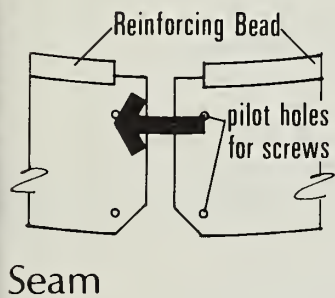
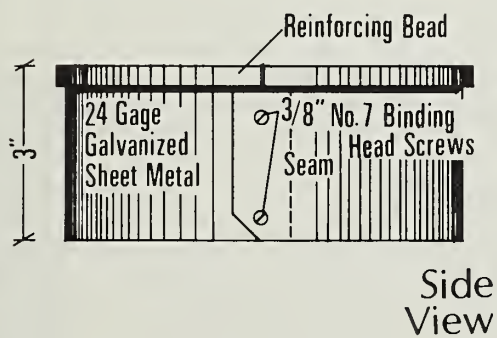
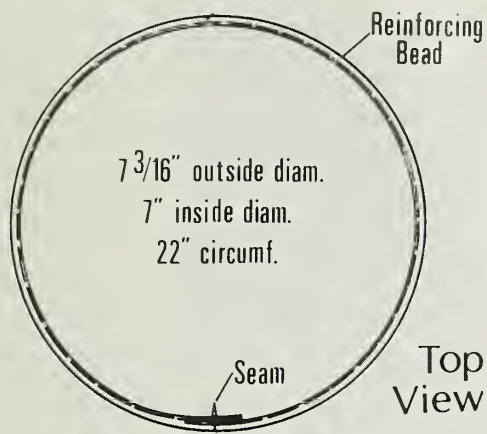


Figure 3.—Construction details for the base band.

Figure 4.—Construction details for the fiberglass screen.

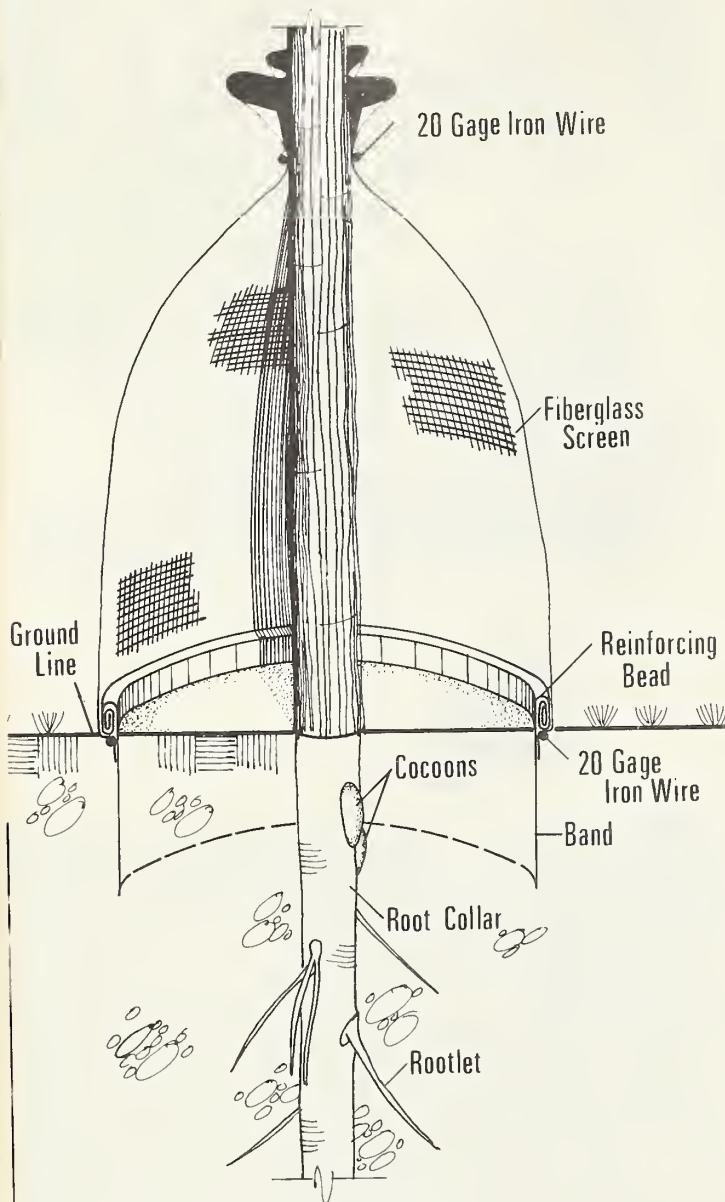


Figure 5.—Schematic diagram of emergence cage in place.

Before opening the cage, the observer should first look through the screen for moths. Adult moths are usually found resting on the screen, occasionally on the tree bole, and rarely on the surface of the litter. The cage should be opened gently because, when disturbed, moths on the screen or tree bole may drop to the ground, feigning death. Moths are more difficult to see and collect on the litter surface.

Adults can be collected by placing a 2-dram shell vial over the head-thoracic region. The moths usually respond by climbing upwards. Very few moths attempt to escape from the cages. Before closing the cage, the observer should examine all interior surfaces, including screen, tree bole, and litter.

These cages may be useful for determining adult emergence of other soil-pupating *Rhyacionia*. At least three other species of tip moths are known to pupate in the soil or at ground level with their cocoons attached to root collars or boles of host trees. The pine tip moth, *R. adana* Heinrich, overwinters as pupae attached to host tree root collars beneath the soil (Martin 1960), while the ponderosa pine tip moth, *R. zozana* (Kearfott), pupates most commonly on the bark of host pines just at ground level (Stevens 1966). An undescribed species of *Rhyacionia* found associated with *R. neomexicana* in Arizona also pupates in the soil attached to root collars of ponderosa pines, and has been collected in these emergence cages.

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